

Passamaquoddy Pleasant Point Primary Production Study

Steve Crawford
Environmental Director/Planner
Passamaquoddy Pleasant Point Tribal Nation
(207) 853-2600
stevecrawford@wabanaki.com

The Passamaquoddy Tribe at Pleasant Point has utilized the waters of Passamaquoddy and Cobscook Bays for sustenance in health and spirituality for millennia. Traditional foodstuffs from the bays include clams, mussels, scallops, periwinkles, flounder, lobster, cod, haddock and pollock. In recent decades there has been a dramatic drop in numbers of all these species, especially since 1990. Clam flats have been covered with green seaweed, suffocating the clams. Red tides have become increasingly common, causing closures of the mud flats to shellfish harvest. Oxygen levels recorded near the salmon pens are now dropping below saturation levels.

These observations are indicative to nutrient loading in the bays. There are several sources of these nutrients, but include sewage from towns and private dwellings, industrial discharge from Domtar Paper Company on the St. Croix River, and a high density of salmon fish farms at the mouths of bays. A number of state, provincial and federal agencies regulate these sources and conduct some monitoring of environmental parameters.

An important measure of nutrient loading is the amount of primary productivity that occurs from phytoplankton and macro algae (seaweeds) in the bays. At this moment, there is no agency that is measuring this parameter on a regular basis. The Passamaquoddy Tribe environmental department is initiating a study to measure primary production of the bay waters on at least a monthly basis, and to measure the green seaweed production on tribal mudflats. This data will be compared to salmon production cycles, weather events, and other factors to help develop an understanding of the increased amounts of green seaweeds, red tides and low oxygen levels. This data will help the regulating agencies make decisions on sewage discharge rates and quality, industrial discharges, and salmon farm densities.

An important environmental parameter to measure, primary production is none-the-less difficult to quantify. The Passamaquoddy Tribe is using two techniques to sample nine areas for accuracy and redundancy. Light and dark incubation bottles are used to calculate production. This is the traditional method, approved by APHA standard methods, but has limitations and is labor intensive. The bottles must be left in situ for several hours and revisited.

The second method is to measure *Chlorophyll a* in the water, making the assumption that all *Chlorophyll a* is from living phytoplankton. The amount can be used to extrapolate estimates of primary production. Limitations to this technique are that this chemical can be difficult to measure, and not all *Chlorophyll a* is from living cells. We are using state of the art instrumentation and SOPs that reduce error.

We are also monitoring green seaweed growth on two mudflats. The species, amount of coverage, density, and weights are recorded in ¼ meter squared sampling stations on two transects in each cove. This sampling occurs within 24 hours of the primary production measurements in the bays. This will help develop a correlation to high nutrient loads in the bays to seaweed growth, or indicate the source of nutrients for these seaweeds is from terrestrial runoff.